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(58) Documents Cited

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EP 0615393 A1 WO 96/37079 A1 US 5396539 A

(58) Field of Search

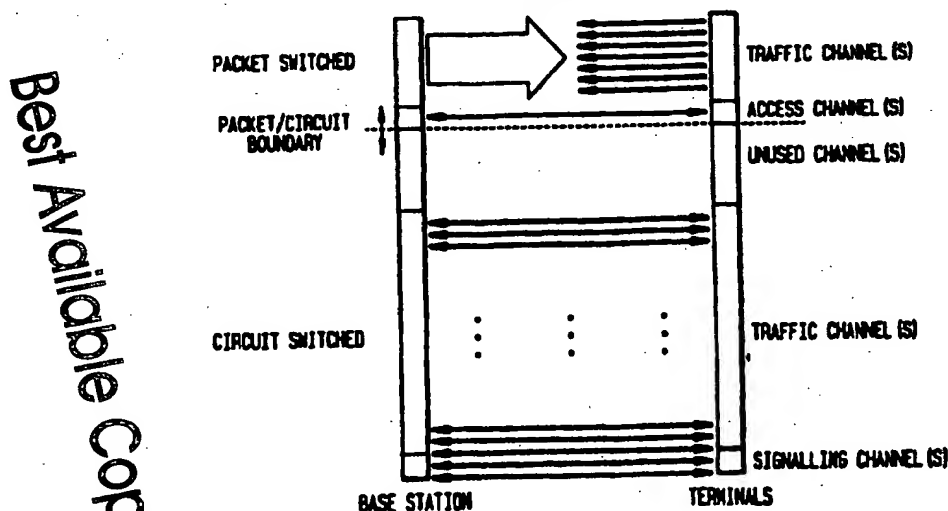
UK CL (Edition O) H4L LDB LDG  
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(54) Abstract Title

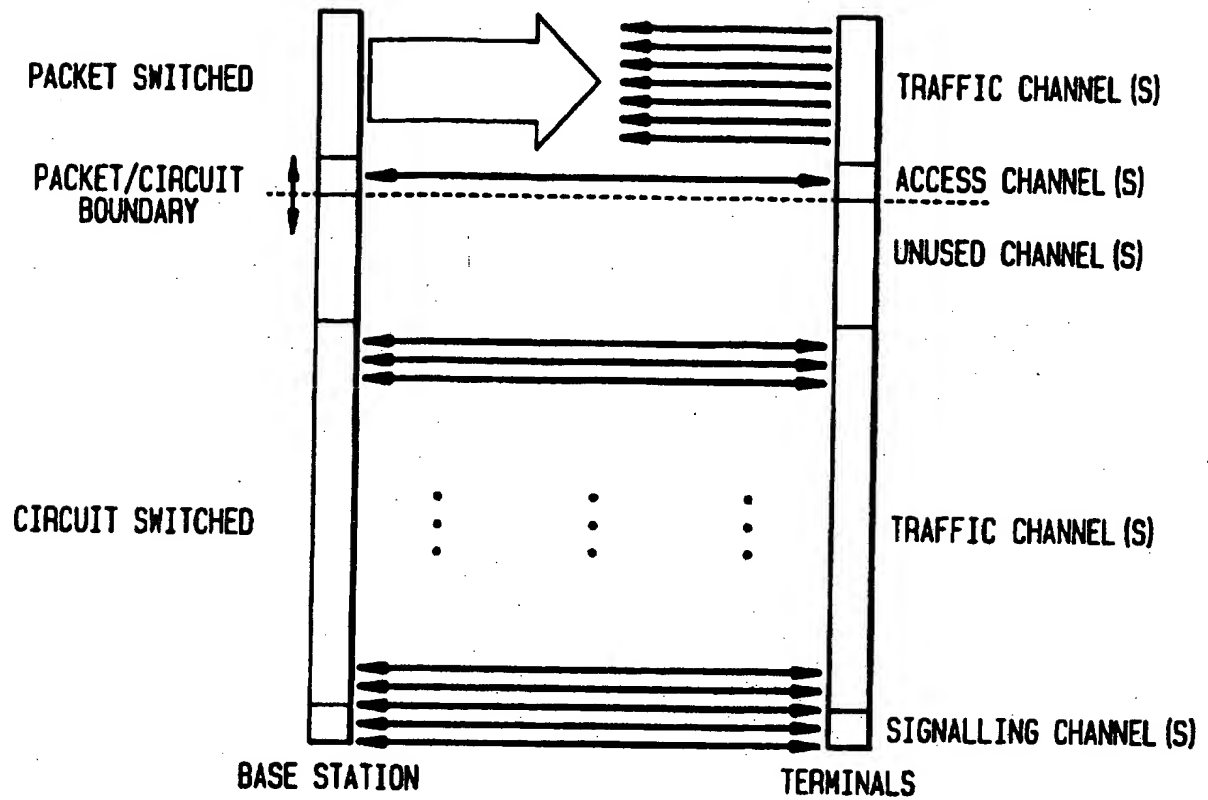
Co-existing circuit and packet switched services on a wireless DS-CDMA system

(57) In a wireless communication system employing CDMA, one or more spare traffic channels (normally used for circuit switched services, i.e. voice channels) are grouped together to form one or more high bandwidth packet switched data channels. These channels can be allocated to one or more users at any time up to a maximum number set by the system. When the last packet switched data user in a group exits the system, the packet switched data channel(s) allocated to that group are de-allocated at the user terminal and base station and revert to normal traffic channels. In an asymmetrical channel structure downlink transfer of data is by packet switched data channels as described above, whereas uplink transfer of data is by one or more traffic channels dedicated to an individual terminal. In a symmetrical channel structure both downlink and uplink data transfer is by packet switched data channel(s) shared by a group of terminals. For systems other than those with a very low loading access to the group of uplink channels is controlled by one or more access channels.

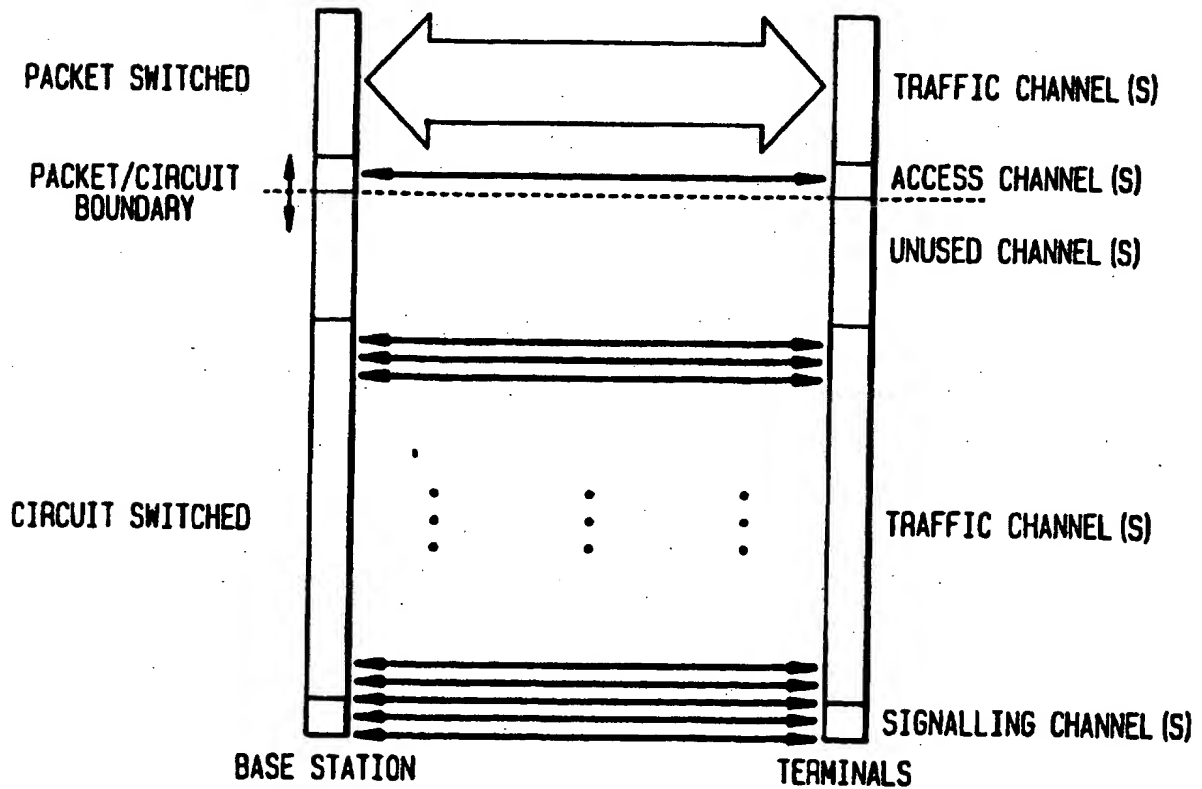
FIG. 1



**FIG. 1**



**FIG. 2**



## **PACKET DATA OPTION FOR CIRCUIT SWITCHED WIRELESS DS-CDMA SYSTEMS**

### **Technical Field**

This invention relates to Circuit Switched Wireless DS-CDMA systems and more particularly to the use of multiple low error rate channels and the associated signalling to form a packet switched service.

### **Background of the Invention**

Circuit Switched Wireless DS-CDMA systems conventionally have a number of different channels including a pilot channel, access channels and traffic channels. A call is allocated one or more traffic channels by the access channels to form a circuit. This circuit is retained for the duration of the call and released after the call end.

For data services such as internet access, the use of circuits in this fashion is inefficient in terms of load per traffic channel and costly in terms of average call holding times.

The ability to mix circuit and packet switching depends on the ability to distinguish between circuit and packet switched data and the ability to concentrate packet switched data onto the same packet data channel while keeping circuit switched services unaffected.

In wireless DS-CDMA systems, all traffic channels are identical and can be allocated to any terminal at any time. Further, the traffic channels can be grouped together to form higher bandwidth channels with no loss of trunking efficiency.

### **Summary of the Invention**

According to the invention there is a method and system as set out in the independent claims.

Particular forms of the invention are set out in the independent claims.

A packet switched option which coexists with a circuit switched wireless DS-CDMA system can be implemented by allocating a group of one or more downlink traffic channels to one or more terminals at the same time. For asymmetrical loading with the higher loads on the downlink, single channels per terminal can be used in the uplink. For symmetrical loading, a group of one or more uplink traffic channels can be allocated to the same set of terminals at the same time. Access to this group of uplink channels can be controlled by additional access channels.

### **Brief Description of the Drawing**

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagram of an asymmetrical mixed circuit and packet switched system channel structure, and

Figure 2 is a diagram of a symmetrical mixed circuit and packet switched system channel structure.

### Detailed Description

In a correctly proportioned mixed circuit and packet switched system, at any time (within the blocking performance), there are spare traffic channels available. These spare traffic channels can be grouped together for use as a high bandwidth packet switched data channel. In a wireless DS-CDMA system this packet switched data channel can be allocated to one or more user at any time. The total number of channels allocated to any one terminal must not exceed the maximum number of channels that the terminal can operate with concurrently.

When the first packet switched data terminal accesses the system, a packet switched data channel comprising one or more traffic channels is allocated if the requisite number of traffic channels are available. Up to a system imposed limit on the number of packet switched terminals per packet switched data channel, the same packet switched data channel is allocated to successive packet switched data terminals. When packet switched data users exit the system, traffic channels are de-allocated at the terminal. When the final packet switched data user in a group exits the system, the traffic channels are de-allocated at the terminal and the base-station.

Figure 1 shows a diagram of an asymmetrical mixed packet and circuit switched system channel structure. In the downlink direction, transfer of data to the terminals is broadcast and contention-free. In the uplink direction, each of the terminals in the group is allocated one or more dedicated traffic channels resulting in contention-free data transfer.

Figure 2 shows a diagram of a symmetrical mixed packet and circuit switched system channel structure. In the downlink direction, transfer of data to the terminals is broadcast and contention-free. In the uplink direction, all terminals in the group have access to the same group of one or more traffic channels. Access to the group of uplink traffic channels is controlled by a suitable medium access protocol. For systems other than those with very low loadings, the medium access control protocol will use a group of one or more dedicated signalling channels.

Although a specific embodiment of the invention has been particularly described, it will be understood that the scope of the invention is not limited by details thereof, but is defined by the claims.

**Claims:**

**1. A method of coexisting circuit and packet switched services on a Wireless DS-CDMA system including:**

**allocating a group of one or more downlink traffic channels to a group of one or more terminals at any one time, said group of one or more downlink traffic channels being for the use of packet switched data transfer, said group of one or more terminals having a maximum number set by the system.**

**allocating a dedicated group of one or more uplink traffic channels to each and every one of the terminals within said group, said separate groups of uplink traffic channels being used for contention free packet data transfer.**

**transferring data from base-station to terminal by contention-free cell broadcast.**

**transferring data from terminal to base-station by one or more contention-free uplink channels.**

**2. A method as claimed in claim 1 wherein more than one group of one or more traffic channels are allocated to more than one group of terminals.**

**3. A method of coexisting circuit and packet switched services on a Wireless DS-CDMA system including:**

**allocating a group of one or more downlink traffic channels to a group of one or more terminals at any one time, said group of one or more downlink traffic channels being for the use of packet switched data transfer, said group of one or more terminals having a maximum number set by the system.**

**allocating a group of one or more uplink traffic channels to said group of one or more terminals, said group of uplink traffic channels being for the use of packet switched data transfer.**

**allocating a group of zero or more access channels to said group of one or more terminals at any one time, said group of zero or more access channels being used for uplink access control.**

4. A method as claimed in claim 3 wherein more than one group of one or more traffic channels and group of one or more access channels are allocated to more than one group of terminals.

Amendments to the claims have been filed as follow

**1. A method of coexisting circuit and packet switched services on a Wireless DS-CDMA system including:**

- broadcasting over a group of more than one downlink traffic channels to**
- 5 a group of one or more terminals at any one time, said group of one or more downlink traffic channels being for the use of packet switched data transfer;**
- allocating a dedicated group of one or more uplink traffic channels to each and every one of the terminals within said group, said group of uplink traffic channels being used for contention free packet data transfer;**
- 10 transferring data from base-station to terminal by contention-free cell broadcast; and**
- transferring data from terminal to base-station by one or more contention-free uplink channels.**

**2. A method as claimed in claim 1 wherein more than one group of one**  
**15 or more traffic channels are allocated to more than one group of terminals.**

**3. A method of coexisting circuit and packet switched services on a Wireless DS-CDMA system including:**

- broadcasting over a group of more than one downlink traffic channels to**
- 20 a group of one or more terminals at any one time, said group of one or more downlink traffic channels being for the use of packet switched data transfer;**
- allocating a group of one or more uplink traffic channels to said group of one or more terminals, said group of uplink traffic channels being for the use of packet switched data transfer; and**
- allocating a group of one or more access channels to said group of one**
- 25 or more terminals at any one time, said group of one or more access channels being used for uplink access control.**

**4. A method as claimed in claim 3 wherein more than one group of one or more traffic channels and more than one group of one or more access channels are allocated to more than one group of terminals.**





# The Patent Office

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Application No: GB 9711142.1  
Claims searched: All

Examiner: Gareth Griffiths  
Date of search: 31 July 1997

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H4L (LDB, LDG)

Int Cl (Ed.6): H04B 7/26, H04L 12/56, H04Q 7/22, 7/24, 7/32

Other: Online Database: WPI

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB2267627 A (ROKE MANOR) whole document	1-4
Y	GB2300090 A (MITSUBISHI) p.23 line 4 - p.26 line 18	1-4
Y	EP0615393 A1 (MOTOROLA) col.2 line 1 - col.4 line 9	1-4
Y	WO96/37079 A1 (QUALCOMM) p.11 lines 18 - 31 & p.16 line 30 - p.17 line 20	1-4
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